

CORRESPONDENCE

Personal exposure of children to nitrogen dioxide

We read with interest a recently published study on personal exposure of asthmatic children to nitrogen dioxide (NO₂), relative to concentrations in outdoor air.¹ In their results, the authors did not find:

"...significant correlation... between each child's weekly mean personal exposures and mean outdoor concentrations for the corresponding periods";

"...marked evidence of seasonality" on personal exposure.

They concluded: "...at low concentrations, changes in NO₂ in outdoor air... contribute little to variations in personal exposure to the pollutant." We think that these conclusions cannot be drawn from the method used to evaluate outdoor concentrations. Besides, we report different findings on a seasonal trend at higher concentrations of personal exposure.

We performed a study to evaluate the annual distribution of personal exposure to NO₂ in school children of Novara, a small city in north west Italy (about 110 000 inhabitants) and to study determinants of this exposure. Exposure to NO₂ was measured with passive samplers (Palmer's tubes) in 310 school children aged 5-14 years. The children wore the tubes for 5 days a week, in each season of the year.

The possible differences in personal measurements were assessed by analysis of variance (ANOVA) and Tukey's tests. Information about the sources of potential exposure was collected by a questionnaire. The relative risk for these variables was estimated with a multiple regression model (logit). The annual average of 6200 measurements was 42.7 µg/m³ with a significant difference between seasons, and higher values in winter. The only factor associated with increased personal exposure was to live along busy streets, and then only for children from playschool (3-6 years). Even if the designs of two studies are different, at this point it is possible to make some comparisons.

Firstly, at higher concentrations of NO₂ exposure, as in those reported by Linaker *et al.*,¹ the seasonal changes in concentration in outdoor air contribute significantly to variations in exposure within individual people. On the other hand, the role of risk factors present at home, and the differences between children are not clear. We think that our results depend on the habits of most children to spend many hours every day in many different occupations away from home, reducing the individual differences caused by domestic sources of NO₂.

Secondly, we think that only one measurement station, as used by Linaker *et al.*,¹ is inappropriate to evaluate the real impact of outdoor concentrations on personal exposure, because outdoor concentrations of pollutants are, in our and in other studies,^{2,3} related to traffic density in each street.

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The bones and hormones of deep water divers and pilots of high performance aircraft

I have hypothesised that paternal hormone concentrations around the time of conception partially control the sex ratio (proportion male) of resulting offspring. Low concentrations of the testosterone/gonadotropin ratio are associated with subsequent daughters.¹ Such low offspring sex ratios have been reported by operators of high performance aircraft²⁻⁴ and deep water divers.⁵⁻⁶ In accordance with my hypothesis, low testosterone/gonadotropin ratios in men have been reported in association with changes in gravitation (as are experienced by operators of high performance aircraft)⁷⁻⁸ and strongly suspected in association with changes in atmospheric pressure (as are associated with deep water diving).⁹⁻¹⁰ It is now clear that high performance aircraft pilots are at increased risk of degenerative lesions of the cervical spine¹¹ and that deep water divers are also subject to skeletal degeneration.¹²⁻¹³ Low testosterone concentrations are an established risk factor for osteoporosis and bone fractures in men.¹⁴⁻¹⁵ So I suggest that the suboptimal bones of men in these two forms of occupation (deep water diving and operating high performance aircraft) are, at least partially, hormonally mediated consequences of these forms of occupational exposure. The point should be investigated.

Moreover the hormone profile of a low testosterone/gonadotropin ratio is established as associated with many illnesses in men¹⁶ as is exposure to deleterious chemicals—for example, the nematocide DBCP¹⁷ and dioxin¹⁸—and to non-ionising radiation.¹⁹ So the question arises: what is the medical importance of this hormone profile in men who are in the workforce or who are serving members of the armed forces and who seem to be clinically well? Does it indicate immunological compromise?

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NOTICE

International course "Principles and methods of epidemiologic research" by K J Rothman. 27-31 October 2002. Lunteren, The Netherlands.

Topics:

- Causation and inference
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